

# Multifunctional, Self-Healing HybridSil Materials for EVA Space Suit Pressure Garment Systems, Phase II

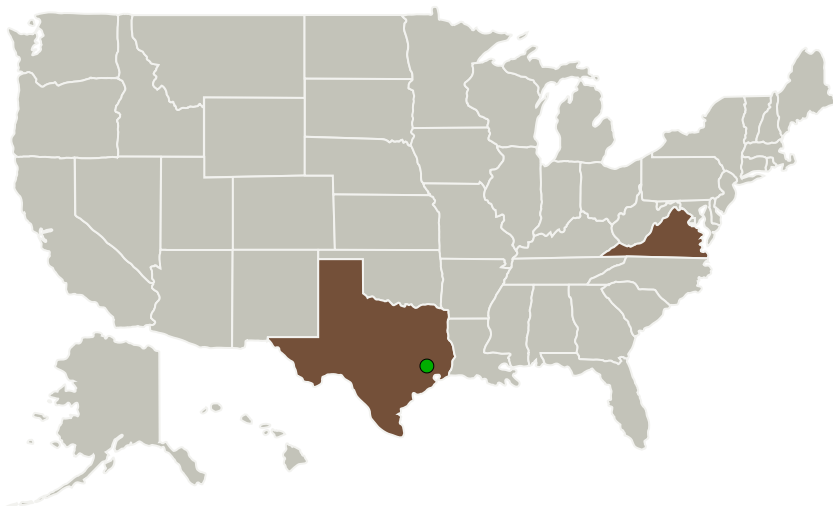
Completed Technology Project (2016 - 2018)



## Project Introduction

A Phase II SBIR transition of NanoSonic's high flex HybridSil space suit bladder and glove materials will provide a pivotal funding bridge toward Phase III maturation of this very promising lightweight, self-healing pressurized space suit assembly technology. Based on highly encouraging Phase I results indicating 1) its self-healing bladder composites instantly repair after puncturing with a 2 mm probe in vacuum at 10<sup>-5</sup> torr to maintain stable operational bladder pressures of 4.3 and 8.1 psi and 2) HybridSil armor array padding provides increased abrasion and puncture resistance at lower weights than currently employed glove padding while meeting established adhesion and modulus metrics, NanoSonic envisions significant Phase III transition potential into next-generation EVA space suit ensembles. To meet its proposed technical objectives, NanoSonic proposes an aggressive 24-month Phase II SBIR research program to further optimize its high flex HybridSil space suit bladder and glove materials and demonstrate their manufacturing compatibility. Upon Phase II completion, NanoSonic will provide NASA with operational lower arm bladder and TMG glove softgood prototypes integrating its optimized high flex HybridSil self-healing composite and armor array padding respectively.

## Primary U.S. Work Locations and Key Partners



MULTIFUNCTIONAL, SELF-HEALING HYBRIDSIL MATERIALS FOR EVA SPACE SUIT PRESSURE GARMENT SYSTEMS, Phase II

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Organizations Performing Work	Role	Type	Location
Nanosonic, Inc.	Lead Organization	Industry	Pembroke, Virginia
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Texas	Virginia

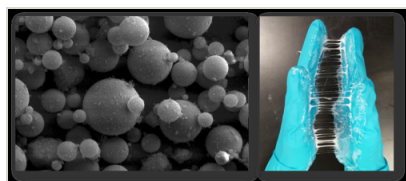
## Project Transitions

**June 2016:** Project Start**September 2018:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140207>)

## Images



### Briefing Chart Image

MULTIFUNCTIONAL, SELF-HEALING HYBRIDSIL MATERIALS FOR EVA SPACE SUIT PRESSURE GARMENT SYSTEMS, Phase II  
(<https://techport.nasa.gov/image/136774>)



### Final Summary Chart Image

Multifunctional, Self-Healing Hybridsil Materials for EVA Space Suit Pressure Garment Systems, Phase II  
(<https://techport.nasa.gov/image/134690>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Nanosonic, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

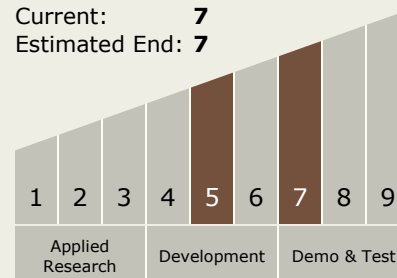
Carlos Torrez

### Principal Investigator:

Victor V Baranauskas

## Technology Maturity (TRL)

Start: 5  
Current: 7  
Estimated End: 7



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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.2 Extravehicular Activity Systems
    - └ TX06.2.1 Pressure Garment

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System